

REMARKS

Applicant acknowledges with appreciation the Examiner withdrawing the previous rejections of claims 35-36 and 39-40 in light of Applicant's arguments and amendments filed November 24, 2008. Applicant would also like to thank the Examiner for discussing the Examiner's interpretation of the *Chunat* reference with Applicant via the teleconference on April 6, 2009.

Claims 1-10, 14-20, and 35-50 are pending. Claims 1-10 have been withdrawn from examination. Claims 11-13 and 21-33 have been canceled, and claim 34 was not entered. Applicant has currently amended claims 35, 41 and 46 to recite a feature ("the phosphorus-containing solution being essentially free of zinc") that was inadvertently omitted when the claims were newly added in the May 23, 2008 Amendment as the claims were intended, as noted at the time, to include the same limitations as the previously-provided independent claims. Applicant respectfully submits that these amendments will not require a new search, but rather harmonizes these claims as originally intended to independent claim 1 and 14, already searched. Therefore, Applicant respectfully requests that the Examiner enter and consider these amendments.

Additionally, Applicant has removed the limitation of claim 35 drawn to the limitation that the "target fluid comprises a hydrophilic fluid" because the term hydrophilic was improperly used and is inconsistent with the position through as such introduction was inadvertent. As the Examiner withdrew the rejection of claim 35 with respect to *Hudson* due to the other limitations added in Applicant's previous Amendment, Applicant respectfully submits that this limitation is not needed to obviate *Hudson*. Moreover, Applicant respectfully submits that this amendment requires only a cursory review by the Examiner without the need for additional searching, and therefore, respectfully requests the Examiner enter the amendment into the record.

In accordance with the Examiner's request to submit evidence that the solution of *Chunat* would be inapplicable to embodiments of the present invention, Applicant submits a signed declaration. Applicant respectfully submits that the present invention is distinguishable over each of the prior art references cited by the Examiner, and in support presents the following arguments in conjunction with a signed declaration.

35 U.S.C. § 103

Response to 35 U.S.C. § 103(a) Rejection in Light of U.S. Patent No. 4,060,433 ("Chunat")

Claims 14-17, 20, 35-38, 41-43, and 46-48 have been initially rejected as being obvious over *Chunat* under 35 U.S.C. § 103(a). The Examiner correctly notes that *Chunat* fails to teach that its solution may be applied to an engine, as well as an engine under engine operating conditions. However, Applicant respectfully disagrees with the Examiner's assertion that it would have been obvious to apply the foaming solution of *Chunat* onto a metal surface that is part of an engine under engine operating conditions, and in support, offers the signed declaration of Dr. Dwight Smith.

Applicant notes that the Examiner defines "engine operating conditions" to include any condition under which the engine is running, which includes running the engine during testing or maintenance while the engine housing is open or the engine is exposed. Therefore, under this interpretation with the current claim language, the solution is effective to create a phosphate-metal layer on a metal part that is part of an engine, i.e. within or on the outside of an engine. Applicant respectfully submits that even with this broad interpretation of the claim language, *Chunat* is not operable to achieve the necessary phosphate-metal layer under engine operating conditions on any part of an engine.

For example, in the embodiments in which the *Chunat* solution is aqueous based, application of the solution to the engine while it is in operation would likely cause the engine to crack due to the rapid cooling caused by the water. To the extent the *Chunat* solution is hydrocarbon based, the mixture would not foam (see signed declaration), which means that the solution would not act in accordance with the requirements of *Chunat* (e.g. proper foam height and dwell time – See Abstract). *Chunat* explicitly teaches that the foaming is necessary to achieve proper dwell time, and this dwell time allows for intimate contact of the solution with the metal surface to achieve the required coating. (see column 3, lines 1-7) Consequently, one of ordinary skill in the art would not use either the aqueous based or hydrocarbon based solution of *Chunat* on an engine under engine operating conditions as there would be no expectation of success.

Additionally, even if the *Chunat* solution could achieve the proper foaming and dwell time, nothing in *Chunat* discloses using its solution on a metal while in operation. Rather, *Chunat* teaches that you spray the foaming solution on the outside surface of an object, maintain this contact for a prolonged period of time through the use of foam, and then rinse it off (see Abstract). Therefore, even with a hydrocarbon based solution, one of ordinary skill in the art would expect to have to subsequently rinse the solution off of the engine, and as discussed above, rinsing the solution off with water (water based solutions being the only rinsing solutions taught by *Chunat* – See column 4, line 64; column 5, line 2; column 8, lines 53-56; column 14, line 45) while the engine is in operation would likely cause catastrophic failure of the engine as described above.

As *Chunat* teaches the use of a foaming solution to be sprayed on the outer surface of a stationary metal component, and those of ordinary skill in the art would understand that none of the embodiments taught by *Chunat* would be successful on an engine under engine operating

conditions, Applicant respectfully asserts that the above referenced claims are not obvious in light of *Chunat*. As claims 15-17, 20, 36-38, 42-43 and 47-48 depend from and therefore incorporate the same limitations of independent claims thought to be allowable, Applicant respectfully requests the Examiner to withdraw the rejection based off of *Chunat* and allow all of the previously rejected claims.

In addition to the arguments identified above, Applicant submits that dependent claims 17, 38, 43 and 48 are allowable because *Chunat* fails to disclose a pH range of about 6.0 to about 8.0. Applicant agrees with the Examiner's assertion that obviousness can exist where claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. However, Applicant respectfully disagrees with the Examiner's assertion that the claimed range of about 6.0 to about 8.0 would be expected to have the same properties of a pH having a range of about 3.0 to about 5.5. For instance, pH is a logarithmic function of the concentration of hydrogen ions. Therefore, even slight variations in pH result in quite large variations in hydrogen ion concentrations.

For instance, the pH of the current invention directly relates to the distribution of phosphate species in the mixture. At a pH range of 7.0, the ratio of $\text{H}_2\text{PO}_4^{1-}$ to HPO_4^{2-} is 1.7. When the pH is at 6.0, the ratio is at 15.8. In contrast, when the pH is at 5.5 (highest value taught by *Chunat*), the ratio of $\text{H}_2\text{PO}_4^{1-}$ to HPO_4^{2-} is 49. Therefore, one of ordinary skill in the art would recognize that the ratio of $\text{H}_2\text{PO}_4^{1-}$ to HPO_4^{2-} of the current invention would need to be approximately

210% higher ($\frac{49 - 15.8}{15.8} * 100 = 210.13\%$) in order to achieve the pH of *Chunat*. Such a large

difference in concentration levels would not lead one of ordinary skill in the art to believe that the solutions would behave in a similar fashion. Rather, a person of ordinary skill in the art

would recognize this as an important distinction and one that fundamentally impacts the functionality of the solution.

Furthermore, a solution's acidity increases dramatically as the pH decreases. A solution at a pH of 7.0 would be considered neutral, whereas a pH of about 6.0 would be considered to be slightly acidic. Consequently, solutions having a pH within the range of 3.0 to 5.5 as taught by *Chunat* would be expected to exhibit different properties than a solution having a pH within the range of 6.0 to 8.0 as they are considerably more acidic in nature. Therefore, Applicant submits that one of ordinary skill in the art would not expect these varying solutions to have similar properties. As such, Applicant respectfully submits that claims 17, 28, 43, and 48 are allowable in light of the teachings of *Chunat* as the claimed pH range does not overlap with that taught by *Chunat*.

Response to 35 U.S.C. § 103(a) Rejection in light of U.S. Patent No. 4,060,433 ("Chunat") in view of U.S. Patent No. 5,106,435 ("Hudson")

Applicant again submits that no person of ordinary skill in the art would look to combine these references as they are in completely unrelated fields. *Hudson* relates to box annealing while *Chunat* relates to coating metal surfaces with a foaming solution that is capable of having a sufficient contact time with a metal substrate. Applicant respectfully disagrees with the Examiner's broad reasoning that one of ordinary skill in the art would combine *Chunat* and *Hudson* because they both apply "a phosphorus containing coating to a metal substrate to form a protective conversion coating layer" (page 5 of Office Action).

Applicant finds no mention within *Hudson* indicating that a "protective conversion coating layer" is formed. In fact, *Hudson* notes that the reasoning for the improved results is unknown. See column 4, lines 53-56 ("It is not known whether phosphorus so introduced tends to raise the A₁

temperature above normal levels or if the role of the phosphorus is to modify carbon diffusivity"). Consequently, one of ordinary skill in the art would not recognize that *Hudson* even teaches formation of a protective conversion coating layer. Rather, one of ordinary skill in the art at best would recognize that *Hudson* has a beneficial outcome attributable to phosphate ions, and might therefore be invited to experiment as to the exact mechanism occurring in *Hudson*. Consequently, a person of ordinary skill in the art would not think to combine *Hudson* and *Chunat*.

Moreover, *Hudson* is focused with minimizing surface carbide formation during box annealing through the application of an aqueous solution of phosphate ion solution prior to annealing. This is unrelated to the problems *Chunat* was designed to address, namely, the problem of prolonging foaming characteristics and adhesion properties of a solution.

Additionally, *Hudson* teaches away from using pH values that are acidic, such as *Chunat* teaches, and instead teaches the use of solutions having a neutral pH (column 3, lines 25-31). As such, Applicant respectfully submits that such combination of two unrelated references, particularly ones that teach away from each other, is not proper, and therefore, respectfully requests that the Examiner withdraw the current rejection based upon the combination of these two references.

In addition to the comments above, Applicant respectfully submits that even in combination, *Hudson* and *Chunat* fail to teach or suggest each and every element of the present invention. For instance, independent claims 14, 35, 41 and 46 all require that wherein the metal substrate comprises at least part of an engine and it be contacted under engine operating conditions. Dependent claims 18-19, 39-40, 44-45 and 49-50 all incorporate the distinguishing characteristic

discussed above in relation to *Chunat*, and are therefore distinguishable on the same grounds as noted above. Therefore, Applicant respectfully requests the Examiner to withdraw the rejection based off of *Chunat* in further view of *Hudson* and allow the aforementioned claims.

CONCLUSION

In commenting upon the references and in order to facilitate a better understanding of the differences that are expressed in the claims, certain details of distinction between the references and the present invention have been mentioned, even though such differences do not appear in all of the claims. It is not intended by mentioning any such unclaimed distinctions to create any implied limitations in the claims. Not all of the distinctions between the prior art and Applicant's present invention have been made by Applicant. For the foregoing reasons, Applicant reserves the right to submit additional evidence showing the distinctions between Applicant's invention to be unobvious in view of the prior art.

The foregoing remarks are intended to assist the Examiner in re-examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered to be exhaustive of the facets of the invention, which render it patentable, being only examples of certain advantageous features and differences that applicant's attorney chooses to mention at this time.

Reconsideration of the application and allowance of all of the claims are respectfully requested. In view of the foregoing Response, applicant respectfully submits that all of the claims are allowable, and Applicant respectfully requests the issuance of a Notice of Allowance. Should

further discussion regarding the application be desired by the Examiner, a telephone conference is respectfully requested. I can be reached at (713) 221-3306. Applicant respectfully submits that no fees are required at this time as this response has been submitted within the three-month shortened statutory period. If Applicant is mistaken in this regards, the Commissioner is authorized to charge BRACEWELL & GIULIANI LLP, Deposit Account 50-0259 (27435.002) in the amount of any deficiency.

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Respectfully submitted,

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